CH 678,616 A5

Job No.: 1505-93888 Ref.: CH 678616
Translated from German by the Ralph McElroy Translation Company
910 West Avenue, Austin, Texas 78701 USA

SWISS CONFEDERATION
FEDERAL OFFICE OF INTELLECTUAL PROPERTY
PATENT NO. CH 678616 A5

Patent for Switzerland and Liechtenstein
Swiss-Liechtenstein patent protection agreement of December 22, 1978

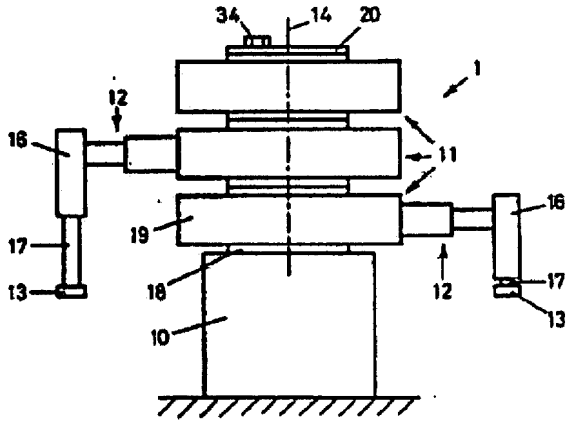
Int. Cl.[5]:	B 65 G	47/68
	B 65 G	47/90
	B 65 B	23/12
Filing No.:	1884/90	
Filing Date:	June 5, 1990	
Patent Granted:	October 15, 1991	
Patent Published:	October 15, 1991	

DEVICE FOR TRANSFERRING PIECE GOODS FROM A FIRST CONVEYOR TO A SECOND CONVEYOR

Inventor:	Michael Senning, Schafffhausen
Holder:	SIG Schweizerische Industrie-Gesellschaft, Neuhausen am Rheinfall
Representative:	Patent Law Firm Isler AG, Zurich

The device (1) consists of a foundation (10) and several disks (11) which are coaxially screwed onto the foundation, one above the other. Each disk (11) consists of a central stator (18) and a ring shaped rotor (19) which is rotatably attached to the stator about a vertical axis (14). The rotor (19) carries at least an arm (12) with a grabber (13) for grabbing piece goods. The

rotational movement of the rotor (19) is controlled by a servomotor. By means of other servomotors of the arm (12), the grabber (13) can be moved radially and axially with respect to the axis (14). As a result of the modular construction, the described device (1) can be used in multiple applications and it can be manufactured cost effectively in large part numbers.



Description

The invention according to the preamble of Claim 1 is known from DE-PS 3 333 301. A disk rotating at constant rpm is located on a bearing. The disk carries two swivel arms which can be swiveled about axes which are parallel to the axis of rotation of the disk. At each free end of the swivel arms an additional swivel arm is attached, which swivel arm carries a vertically moveable grabber at its free end. As a result it is possible to briefly stop the grabber in spite of the constantly rotating disk, to grab a confectionary product over a conveyor belt, and to move it during the introduction of the object into a packaging box which passes by and synchronously with the box.

The present invention is based on the problem of modifying a device of the type mentioned in the introduction in such a manner that it can be used for multiple purposes. This problem is solved by the characterizing portion of Claim 1.

Below an embodiment example of the invention is further explained with reference to the drawing. In the drawing:

Figure 1 shows a schematic top view of the device in an application where it is used to fill containers,

Figure 2 shows a side view of the device according to Figure 1,

Figure 3 shows an axial cross section through a disk, and

Figure 4 shows a top view of the disk according to Figure 3.

In the schematic representation according to Figure 1, two devices 1 according to the invention are shown in an application where they grab biscuits 3 which are continuously

supplied by a conveyor belt 2 and deposit each of them in the tubular intermediate container 4 on an additional conveyor section 5 and form stacks in that container. The conveyor sections 5 lead the filled containers 4, for example, to a packaging machine 6.

As represented in Figure 2, the device 1 consists of a foundation 10 and several disks 11 which are coaxially screwed onto the foundation, one above the other. Each disk 11 carries at least an arm 12 with a grabber 13 which in the represented embodiment example is designed as a suction cap to grab the biscuits 3. The grabber 13 can be moved by means of the arm 12 radially with respect to the axis of rotation 14 of the disk 11 in question and parallel to this axis 14. For this purpose, in the representation according to Figure 2, the arm 12 consists of a radially arranged telescope 15 which carries, on its free end, a second telescope 16 which runs parallel to the axis 14. The grabber 13 is attached to the moveable member 17 of the second telescope 16. Each grabber 11 consists of a central stationary stator 18 and a ring shaped rotor 19 which is rotatably attached to the stator 18. The upper stator 18 is covered by a cover 20.

In Figure 3, an axial cross section through the disk 11 is shown. The stator 18 is slightly thicker than the rotor 19. On one front side 22, it has pins 23 and, on the other front side 24, it has bores 25 which are aligned with the pins to center stacked disks 11 with respect to each other and with respect to the foundation 10. Furthermore, the stator 18 has perforating bores 26 to allow screwing to the foundation 10 by means of screws 34. On the front side 22, several electrical plug contacts 27 project, and, on the front side 24, sockets 28 are attached, which are aligned with the plug contacts. The aligned plug contacts 27 and sockets 28 are interconnected by lines 29, 30. The two lines 29 serve the function of transferring the feed voltage for the control devices 31, 32 in the stator 18 and in the rotor 19. The line 30 is a data bus for transmitting control commands from a central control 33 to the individual disks 11 and for transmitting any control commands from the disks 11 to the central control 33. This data bus can also be designed as an opto electronic device, where a photo receiver is arranged instead of a pin 27 and a light diode is arranged instead of the associated socket 28. The light diode, controlled by the device 31 repeats the signal received by the photo receiver.

The stator 18 furthermore has two perforating bores 38 for the pneumatic supply of the rotor 19, for example with vacuum for the grabber 13 and pressurized air for the actuation cylinder.

The rotor 19 is attached to the stator 18 by means of ball bearings 39. A servomotor 40 controlled by the device 31 serves to turn the rotor. A pinion 41 on the drive shaft of the motor 40 engages a tooth crown 42 of the rotor 19. Two slip rings 43 on the stator 18 serve to transmit the feed voltage to the control device 32, and an additional slip ring 44 serves to transmit control and sensor signals between the devices 31, 32. Corresponding brushes 45 are attached to the rotor 19. As an alternative, the slip rings 43, 44 can also be arranged on the rotor 19, and the

brushes 45 on the stator 18. To transfer the pressurized air and the vacuum, the stator 18 has two circumferential grooves 46 which communicate through cross bores 47 with the bores 38. Radial bores 48 in the rotor 19 open in these grooves 46 and they feed a valve unit 49, which is controlled by the device 32. In the embodiment example according to Figure 3, the arm 12 is represented as parallelogram rods 52. The grabbing movement is controlled by the servo cylinders 53, which are controlled by servo valves in the valve unit 49. To retract the position of the grabber 13, linear position transducers 54 are used. Instead of the cylinders 53, one can also use electrical positioning motors, for example servo motors with threaded spindles. At the end of the rod 52, a vertical tube 55, whose lower end carries the grabber 13, is attached in a detachable manner. The tube 55 is connected through a hose 56 to the switch valve in the valve unit 49. The tube 55 has different lengths for the different rotors 19 which are arranged one on top of the other, so that all the grabber 13 are at approximately the same height. Tube 55 and grabber 13 can easily be switched to another grabbing direction, for example when other products are to be handled.

To keep the inertial moment of the rotor 19 low, its housing 57 as well as the arm 12 and the grabber 13 are advantageously made of a light, stiff material, preferably a carbon reinforced plastic.

During operation, the described device works as follows: the position of the biscuits which are continuously delivered on the conveyor belt 2 is acquired by a sensor which is not shown, for example by a television camera with an evaluation device. The signals of this sensor are fed to a central control 33. All the rotors 19 of the disks 11 turn in the same direction but not at a constant speed. The average speed is a function of the speed of the belt 2. Through the data bus 30 the control devices 31 of the individual disks 11 are individually controlled and, from the control 33, they receive the commands for the movement of the servomotor 40 and the arm 12 which is required to grab the biscuits 3. The movement of the grabber 13 is controlled in such a manner that the relative speed between the grabber 13 and belt 2 is very small. In the same manner, as the rotor 19 continues to turn, the biscuit which is grabbed is deposited, in a targeted manner into the container 4 or, for example, into a packaging box, where again, during the deposition, the horizontal movement of the grabber 13 is synchronized with the movement of the container.

As a result of the modular construction, the described device can be used in multiple applications and it can be manufactured cost effectively in a large series. In addition, the assembly of disks 11 can be completed, with the exception of the grabber 13 which must be hung, and after testing said disks can be stored so that short delivery times can be achieved for new installations. It is also possible, for example, to use the device 1 for grouping piece goods on a second conveyor belt, for filling praline boxes with different pralines, for palletizing packed

piece goods, for removing by sorting any incorrectly packed goods, for filling an intermediate storage container or similar purposes. Thanks to the modular construction, it is also possible to add additional disks 11 at a later time to the device 1, for example to increase capacity.

In the represented embodiment example, each grabber 13 has three degrees of freedom controlled by servomotors, namely the rotation about the axis 14, the radial separation of the grabber 13 from the axis 14, and the shift parallel to the axis 14. Depending on the application, it can be desirable to provide an additional degree of freedom, for example, a rotation of the grabber 13 about a high axis which is parallel to the axis 14. This is useful, for example, when longitudinal products, for example, chocolate bars, are to be deposited with a certain orientation.

Claims

1. Device for taking over piece goods (3), in particular baked goods or confectionary goods, from a first conveyor (2) and transferring them to a second conveyor (5), consisting of a foundation (10), at least one carrier disk (11) which is rotatably attached to the foundation and several reception devices (13), characterized in that the carrier disk (11) is connected with one of its front sides (22) to the foundation (10), in a detachable manner, and in that it presents means (25, 26) on its opposite front side (24) for the attachment of additional identical carrier disks (11).

2. Device according to Claim 1, characterized in that the carrier disk (11) consists of a central stationary stator (18) and a ring shaped rotor (19) which is rotatably attached to the stator (18), and in that the attachment means (25, 26) are arranged on the stator (18).

3. Device according to Claim 2, characterized in that the reception devices (13) are each attached to an arm (12) which projects from the rotor (19) and in that each reception device (13) can be moved in a controlled manner at least radially and parallel to the axis of rotation (14) of the rotor (19).

4. Device according to Claim 3, characterized in that each reception device (13) is connected in a detachable manner allowing replacement with the concerned arm (12) and in that additional different reception devices are present for exchange with the first reception devices (13).

5. Device according to Claim 3 or 4, characterized in that the arm (12) can be telescopically shifted in the radial direction.

6. Device according to one of Claims 2-5, characterized in that a servomotor (40) for turning the rotor (19) is provided in the stator (18).

7. Device according to one of Claims 2-6, characterized in that means (27, 28, 38) are arranged in the stator (18) on both front sides (22, 24) for transmitting energy and signals, in that additional energy and signal transfer devices (43, 44, 45, 46, 48) are provided between the stator

(18) and the rotor (19), and in that the rotor (19) contains a control device (32) for controlling the movement of the reception device (13).

8. Device according to Claim 7, characterized in that the additional signal transmission devices comprise slip rings (43, 44).

9. Device according to Claim 8, characterized in that the slip rings (43, 44) are attached to the rotor (19).

10. Device according to one of Claims 2-9, characterized in that the housing (57) of the rotor (19) as well as the reception devices (13) are made of a light, stiff, material, preferably a carbon reinforced plastic.

Fig. 1

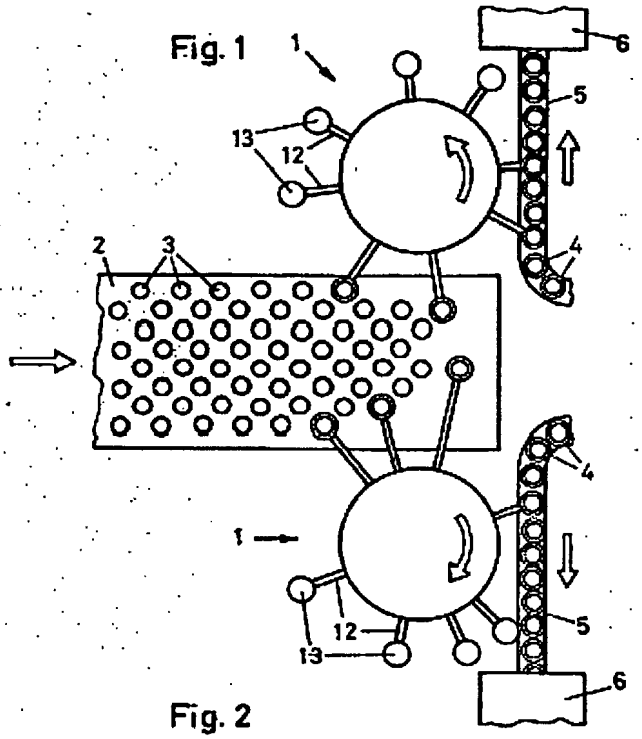
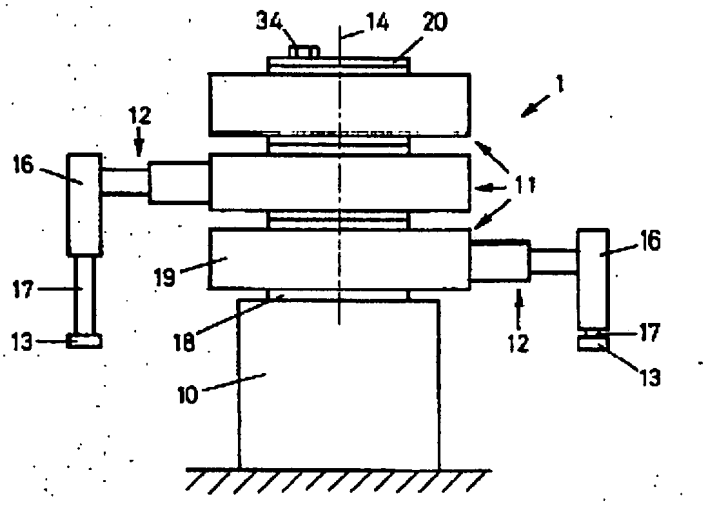


Fig. 2



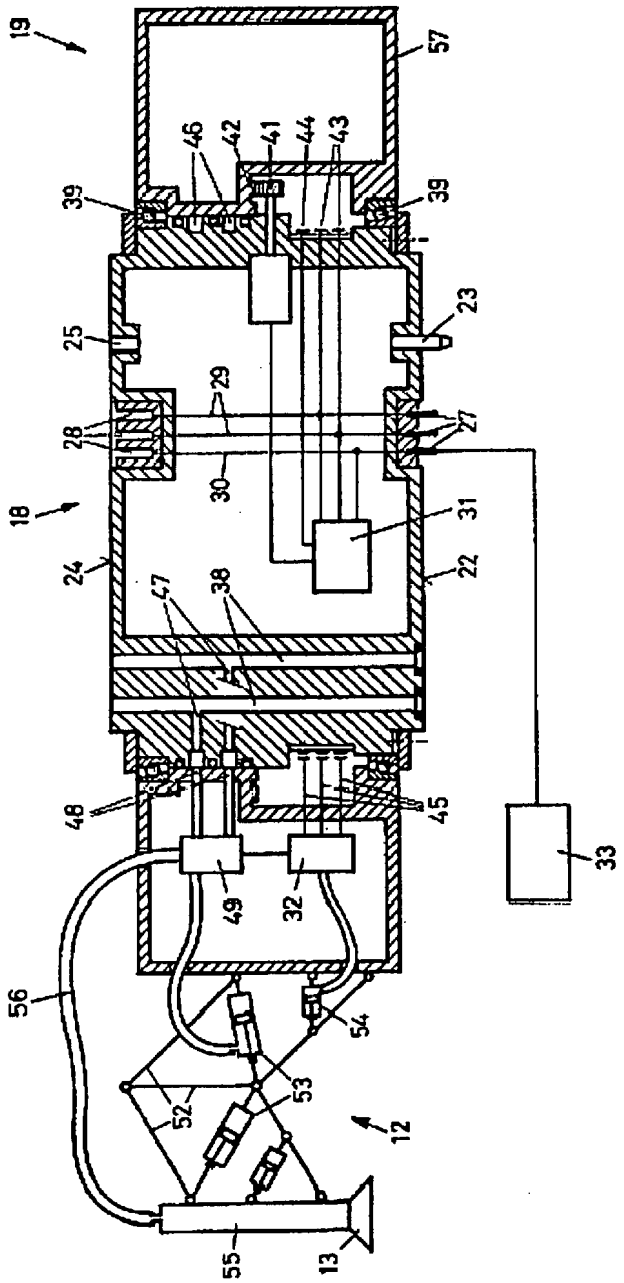

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Fig. 3

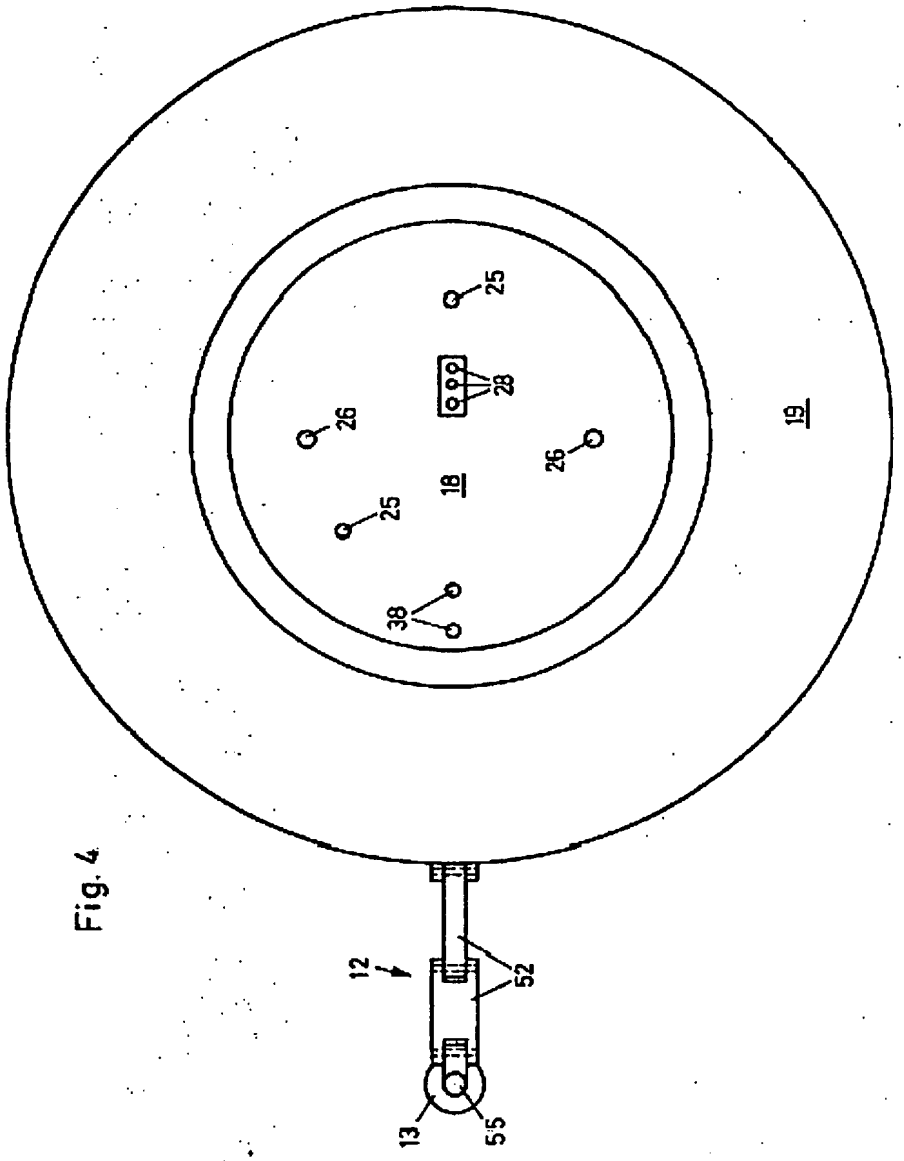

Fig. 4